ENDANGERED LANDSCAPES PROGRAMME

Explanatory notes for applicants

Purpose

The purpose of this document is to provide some consistent guidance, explanation of terms, and links to sources of additional information for applicants on a range of issues relevant to the Endangered Landscapes Programme. Some sections provide instructions specific to projects funded by the ELP (e.g. on *Project-based experiments to test interventions*) whilst others are more general.

Applicants are advised to read these notes before planning their project or writing their grant application.

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Landscapes

Addressing conservation through establishing small, isolated reserves will not, on its own, be enough to conserve biodiversity, especially in the long-term. Some species have large ranges and wildlife needs room to move and to disperse, especially in the face of climate change. Ecosystem processes operate at scales significantly greater than the site or community level. Heterogeneity within systems is a product of natural ecological processes including natural disturbance events or natural trophic dynamics, which require large areas. Therefore a large scale, *landscape* approach is needed to future-proof conservation by creating the space that nature and natural processes need. The juxtaposition of different ecosystems within landscapes/large areas creates greater opportunity for ecotones, gradations and spatial complexity to create large scale mosaics and spatial heterogeneity.

Landscape size

Different species scale the environment differently - the area needed to sustain a population of otters will be different from that required by red squirrels which will be different again from that required by golden eagles. Therefore, from a nature conservation perspective the size of a landscape where an intervention takes place is likely to vary depending on what constitutes a mosaic of habitats relevant to the particular conservation objectives and the practicalities of land availability. Landscapes may also be defined from perspectives other than those concerned with wildlife conservation – for example from an ecosystem services perspective (hydrological function, recreational services etc.) or according to their aesthetic or scenic qualities. *There is no absolute size for a landscape,* although the Endangered Landscapes Programme seeks to support the restoration of nature and ecological processes at scales larger than the individual site.

Resilient landscapes

Resilience has been defined as nature's "capacity for renewal in a dynamic environment"1. The dynamic change of most concern for nature conservation today is climate change. The Nature Conservancy defines a climate-change resilient landscape as "an area of land with sufficient variability and microclimate options to enable species and ecosystems to persist in the face of climate change, and which will maintain this ability over time." This resilience is based on at least two characteristics of landscapes - their complexity and their permeability (or connectedness). Complex, heterogeneous landscapes provide species with a range of micro-climates into which they can move as climate changes. Landscapes that are connected allow species to move as they respond to climate change and other stresses. How a landscape is managed (the positioning and design of roads and waterways, use of land for agriculture and forestry etc.) affect its permeability[2].

Approaches to landscape restoration

There are many, often conflicting demands on our lands and seas: conservationists seek to conserve natural habitats and species; farmers seek increased productivity and better access to markets; governments require the generation of electricity and minerals for construction; urban residents seek places for recreation. A consequence of restoring at landscape (rather than individual site) scale is that projects are likely to encounter a mosaic of different land uses that are meeting a variety of

[1] Gunderson, L.H., 2000. Ecological resilience — in theory and application. *Annual Review of Ecology and Systematics* 31:425-439.

[2] Mark Anderson (2012) Landscape Resilience = Options and Alternatives. https://www.conservationgateway.org/News/Pages/SC-Landscape-Resilience-Options-Alternatives.aspx

human needs – e.g. forestry, farmland, riparian habitats, pasture, floodplain – and a range of associated stakeholders and institutions. As a result, projects may need to adopt a broad-based, collaborative approach which engages, considers and balances these interests and demands.

Finding a balance between these dimensions that is appropriate to the local context means that there are many potential and equally valid models for landscape restoration. These can be classified into three main (interrelated and non-exclusive) categories:

1. *Comprehensive restoration of a landscape*, including extensive 'rewilding' where natural processes such as large herbivore grazing are allowed to drive the dynamics and landscape pattern;
2. *Restoring connectivity within a landscape*, e.g. through physical or functional corridors or restored hydrology (see explanatory note on Corridors and Connectivity);
3. *Contributing to the improved health of ecosystems and species populations within the landscape,* e.g. by doing targeted interventions across the landscape, through which the whole is greater than the sum of its parts. This may include the 'softening' or extensification of land-use over a large area within which there may be nature-friendly productive activities such as native timber production and low input agricultural use.

Applying for a grant

Grant applicants to the Endangered Landscapes Programme are expected to justify the landscape in which they are working (in terms of its content, boundaries, scale and context) relative to their stated biodiversity conservation goal and any additional objectives (e.g. restoring ecosystem service functions) or issues (e.g. governance, administration and tenure).

Restoration

Definition

The Endangered Landscapes Programme defines landscape restoration as:

> *The improvement of damaged or degraded[3] ecosystems on a large scale to create habitats rich in biodiversity and resilient to environmental change, with sustainable, long-term benefits to society.*

The fundamental difference between restoration and other conservation efforts is that conservation attempts to *maintain and protect* existing habitat and biodiversity, whereas restoration is a more proactive, positive approach that attempts to *reverse* existing environmental degradation and population declines. Perhaps the best approach to restoration is a blend of learning from the past (which can rarely, if ever, be replicated) and new ideas / techniques that aim to adapt to the changing world.

Features

Ecosystem improvement

In the definition above, 'improvement' relates to the ecosystem's health (sufficiently resilient to endure the normal periodic stress events in the local environment; recovery of associated ecosystem processes and services), integrity (representation of key functional groups and having an assemblage of species characteristic of the target or reference ecosystem) and sustainability (capable of sustaining reproducing populations of the species necessary for its continued stability or development along the desired trajectory). Ecological integrity may be built by (for example) re-connecting disconnected elements of the landscape; reintroducing missing biodiversity; or reducing or removing the pressures that led to degradation (and are preventing recovery).

Baselines and reference systems

A key concept in many restoration initiatives is the identification of a reference ecosystem that informs the target of the restoration project. However, restoration is not about putting the clock back and restoring systems to their original state – it can and should be a forward looking approach. Although restoration may be *guided* by a reference system, it recognises that ecosystems are dynamic and must be allowed to adapt and evolve over time in response to changing environmental conditions and human pressures, including irreversible anthropogenic climate change and irreparable physical damage (e.g. as a result of erosion or irreversible changes in fire regimes)[4].

Harnessing natural processes

In practice, most restoration initiatives let nature do the work. The Society for Ecological Restoration describes this principle as follows:

> *"We can create the conditions and assemble components, but the work of recovery is carried out by the biota themselves through germination or birth/hatching, growth, reproduction, recruitment, and interaction with other organisms and their environment over time. Restoration can facilitate this by assisting the return of appropriate cycles, flows, productivity levels and specific habitat structures and niches. This suggests that*

[3] "The term 'degraded' refers to any harmful alteration of an ecosystem such as the introduction and spread of an invasive species; the loss of important species interactions; the loss of biophysical attributes such as soil structure and chemistry or hydrological processes; and the decline in its potential to sustain livelihoods". Keenleyside, K.A., N. Dudley, S. Cairns, C.M. Hall, and S. Stolton (2012). *Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices*. Gland, Switzerland: IUCN. x + 120pp

[4] McDonald T, Gann GD, Jonson J, and Dixon KW (2016) *International standards for the practice of ecological restoration – including principles and key concepts*. Society for Ecological Restoration, Washington, D.C.

restoration interventions should be focused on reinstating components and conditions suitable for these processes to recommence and the degraded ecosystem regain its pre-degradation attributes, including its capacity for self-organization and resilience to future stresses. The most reliable and cost effective way to achieve this is to harness any remaining potential of species to regenerate and undertake more intensive intervention only to the extent that regeneration potential has been depleted."

The Endangered Landscapes Programme supports initiatives which help overcome barriers to such natural processes of recovery, moving ecosystems to a tipping point beyond which a cascade of ecological (and social) changes restore an ecosystem's health.

A restoration continuum

Almost nowhere in Europe has been untouched by human influence. Therefore all places can be considered degraded or damaged, to a lesser or greater extent, compared to pristine 'wilderness' (wilderness defined as '*an area of land where people do not live or grow crops and where there are no buildings*'[5]). Places can be placed on a continuum[6], with heavily modified ecosystems at one end (farmland, urban areas) to remote areas with little human influence at the other; restoration – reducing human influence, giving more space for nature, allowing natural processes more freedom – can take place anywhere along this continuum.

Large scale

Landscape restoration puts the emphasis on restorative actions beyond the site level. Benefits of restoring at large scale include:

- Natural processes are given increased freedom to create natural patterns and distributions of species helping to create habitats that are more characteristic of their natural state, and that support the expected range of plants and animals.
- It permits a more holistic approach in which the influences on the system originating outside a specific site (for example from adjacent land use) are proportionally less, and can be taken into account and minimised.
- Large areas result in dynamics and habitat conditions that are more resilient and sustainable than in smaller sites which may need intensive management to maintain the desired features.
- Large areas are relatively more diverse in ecological conditions (e.g. in soils and vegetation) and are more likely to include ecological gradients (e.g. altitudinal gradients). Therefore they are more likely to provide refugia for many species under climate change and may act as sources for colonisation of other sites.
- Large areas provide more space for natural processes to drive restoration (there is less need for ongoing management and intervention) and the greater resilience of large-scale systems means that per hectare management costs are reduced[7].
- Restoring the delivery of many ecosystem services requires large areas – for example, flood management needs a catchment approach.

There are few places in Europe where people are absent. At large scale the probability that people live or work in the area increases and may entail compromise between environmental, economic

[5] MacMillan Dictionary (http://www.macmillandictionary.com/dictionary/british/wilderness)
[6] Carver, S. (2014) Making real space for nature: a continuum approach to UK conservation. *ECOS* 35(3/4): 4-14
[7] However, initial preparatory management may often be necessary to maximise the full potential of future natural processes. Also, the outcomes from natural processes are not entirely predictable and it would be inappropriate to rule out the need for future management to nudge a system in a particular direction.

and social concerns. However, landscape restoration can provide opportunities to combine recovery of ecosystems with socio-economic development.

Restoration and rewilding

There are various definitions of the term 'rewilding': some focus on the re-establishment of ecosystem processes (in some cases via species reintroduction), while others highlight the withdrawal of active human management intervention. Many of the current definitions have come from academia, from where the ideas and principles behind rewilding have largely developed[8].
In general terms, the main difference between restoration and rewilding is that rewilding has as its ultimate goal naturally-functioning landscapes that can sustain themselves and their biodiversity and ecosystem values without the need for active human management[9]. Therefore rewilding as a conservation method can be defined as "*the long-term restoration of ecosystem processes over a suitable area, with the aim of moving towards passive, non-intervention management*."

[8] Jørgensen, D. (2015) Rethinking rewilding. *Geoforum* 65 (2015) 482–488

[9] However, many 'rewilding' initiatives use large herbivores, typically livestock, to drive ecological change. This is clearly an interventionist approach which many would argue falls within the spectrum of habitat restoration as defined here.

Corridors and Connectivity

What are corridors?

Corridors are habitats that are typically long relative to their width, and they connect fragmented patches of habitat. They can vary greatly in size, shape, and composition. The main goal of corridors is to facilitate movement of individuals, through both dispersal and migration, so that gene flow and diversity are maintained between local populations. By linking populations throughout the landscape, there is a lower chance for extinction and greater support for species richness.

How do corridors work?

Corridors work by increasing connectivity between patches that are isolated by human habitat fragmentation, caused primarily by urbanization, agriculture, and forestry. Plants and animals can use corridors for both dispersal and migration, two key movement patterns for species persistence. The human-dominated habitats surrounding more natural areas present barriers that plants and animals are unable or highly reluctant to move through. These inhospitable places may have higher abundances of predators, lower resource availability, or reduced shelter. When a corridor is present, however, it provides an unbroken path of suitable habitat that can provide safe passage for animals or plants without being hindered as they travel through agricultural or urban landscapes. This connectivity is key to population persistence, as it promotes gene flow between populations and supports higher species diversity.

What types of corridors are there?

There are many kinds of corridors, and the differences are often due to the purpose of the corridor. Corridors can exist naturally, such as riparian corridors that link two different populations dependent on isolated wetlands, and they can be constructed through management practices, such as preservation of multiple land parcels to create a wildlife corridor for large mammals. Corridors can be artificially constructed, such as overpasses or underpasses on highways, for the sole purpose of funnelling individuals away from anthropogenic threat. Stream corridors can consist of a network of protected watersheds that allow fish to disperse or migrate long distance without being hindered by a road blockage or dam. Corridors can be large, as is typical in wildlands that follow mountain chains, or small, as is typical of greenways or wildlife overpasses in urban landscapes. The many different types of corridors all focus on the same goal: to ensure connectivity between isolated habitat patches so that one or many species can move freely throughout the landscape.

Corridors versus connectivity?

Landscape connectivity refers to how able plant or animals are able to move through a landscape. More connectivity means fewer barriers to dispersal or migration. Corridors are the clearest way to increase connectivity, as they provide structural connections between habitats in the landscape. But, there are other ways to increase connectivity where strict conservation is not possible. It may be possible to reduce the distance between conservation areas, or to manage lands in ways that are less harsh for wildlife. Plant and animal dispersal and migration are not always incompatible with

human uses of the landscape. Conservation goals often include both benefits to humans and supporting biodiversity.

What are some examples of corridors?

There are many examples of both natural corridors and man-made corridors around the world. To see some of these examples visit the Conservation Corridor website by clicking here.

Source

This information has been reproduced from the Conservation Corridor website:
http://conservationcorridor.org/the-science-of-corridors/

Tipping Points

The Global Biodiversity Outlook defines a tipping point as '*a situation in which an ecosystem experiences a shift to a new state, with significant changes to biodiversity and the services to people it underpins, at a regional or global scale*'. It goes on: '*tipping points are a major concern for decision-makers because of their potentially large impacts on biodiversity, ecosystem services, climate change and human well-being'*.[10]

Most ecological and environmental approaches tend to view tipping points as negative – a shift away from a more natural state to one that is depleted in terms of biodiversity and has less capacity to deliver ecosystem services (and is hard to reverse).

However, importantly for initiatives focused on restoration, tipping points can be considered as a two-way road. The 'Eco Tipping Points Project'[11] describes an environmental tipping point as '*a part of the human-environment system that can lever far-reaching change in the system. A change at the tipping point sets in motion mutually reinforcing feedback loops that propel the system on a completely new course'*.

Importantly, **these tips can work in either direction**:

"*A 'negative tip' is a switch from a desirable stability domain to an undesirable one, a change from a sustainable environmental support system to deterioration of the system's services. A 'positive tip' is a switch from an undesirable stability domain to a desirable one. Deterioration is turned around and the human-environment system heads toward greater sustainability".*

Apo Island in the Philippines provides an example of environmental tipping points in action. The introduction of destructive fishing methods was a "negative tip" that set the regional fishery on a forty-year downward spiral to virtual collapse. Apo Island escaped the downward spiral with a "positive tip" — the creation of a small marine sanctuary — which, through a serious of feedback loops, set in motion a cascade of ecological and social changes that restored declining fish stocks and returned the island's marine ecosystem to health[12]. Impacts were catalytic as the initial steps towards environmental recovery triggered a series of positive feed-back loops in social and ecological systems. This example is typical in that the tipping point was reached through introduction of an environmental technology (in the broadest sense), coupled with the social organization to put it into effective use.

The Endangered Landscape Programme aims to support projects which have a theory of change which has identified such strategic opportunities to reverse negative cycles and deliver positive environmental and social outcomes. Such initiatives have an increased probability of demonstrating the following characteristics:

- **Cost effective**. A targeted set of activities designed to bring the system to the tipping point can have far reaching impacts as effects, once triggered, proliferate.
- **Time-bound action** coupled with **sustainable, self-perpetuating outcomes**. Activities are focused on bringing the system to the tipping point – during the project period. After that, positive feed-back loops sustain the change process without the need for significant additional, external input and investment.

[10] https://www.cbd.int/gbo3/ (also http://biodiversity.europa.eu/topics/tipping-points)
[11] http://ecotippingpoints.org/about-etps.html#howwork
[12] http://ecotippingpoints.org/resources/understanding-how-ecotipping-points-work.html

- **Replicable**. Lessons contribute to a better understanding of the strategic points (ecological, cultural, political and institutional) and mechanisms through which to restore degraded landscapes.

Tipping points won't be relevant to all efforts to restore habitats and ecosystem processes. However, where appropriate applicants to the Endangered Landscapes Programme should include the following information in relation to tipping points (integrated into their proposal):

- A description of the landscape-scale/ecosystem level change that the project is seeking to achieve.
- A description of the tipping point, including:
    - a clear theory of change
    - the positive feedback loops and mutually reinforcing processes expected to cascade once the tipping point is reached
- A description of the conservation interventions[13] that the project will put in place during the course of the granting period to deliver this change
- The anticipated timescale for achieving this impact (and the situation expected to have been reached by year 5, or the end of the project)
- Key areas of uncertainty
- Risk analysis – factors which may prevent the tipping point from being reached – and mitigation measures
- Relevance of the 'tipping point' to other landscapes (what are the opportunities for replication?)

[13] These might be practical management interventions, such as flooding, tree planting or reserve creation, interventions to bring about changes in society, means of affecting policy or legislative measures or governance mechanisms. Most likely they will be a combination of these.

Creativity and Culture

Creativity

Restoration does not have to mean restoring something to an exact former state. Restoration can involve novel thinking about improving quality, just as much as a retrospective view. Perhaps the best approach to restoration is a blend of learning from the past (which can rarely, if ever, be replicated) and new ideas / techniques that aim to adapt to the changing world. Therefore restoring landscapes is at its best a *creative* process. Creativity, either consciously or sub-consciously, is critical to long term landscape restoration success – something new is being created, no matter how hard one tries to emulate or imitate what went before.

Creativity is closely allied to human values of responsibility, respect, trust and empathy. The presence of man-made beauty shows that others care for and respect the local environment, which is more likely to instil a sense of responsibility and respect in others for the restored landscape.

Creativity through art – visual or performance – can offer new perspectives on the familiar. This applies to those who have known the landscape for a lifetime as much as to temporary visitors. Such changes in perspective may help to overcome previous prejudices and encourage others to dig deeper into why they are there, what the land means, who and why it became damaged and who and why it was given a new life, i.e. it can be used as a successful means of public education. Such methods enrich the landscape, help bind in local people and attract new people to settle.

In many instances, particularly where tourism or access to the land is a goal, creative ideas can be used to instil a connection additional to that experienced from simply being in a natural landscape. Such emotional ties can persist for a person's lifetime engendering ongoing, indefinite support for a project's goals that persist beyond the landscape in question, both geographically and temporally.

Creative approaches can be used in the critical work of engaging local communities, by developing participative, immersive methods that build on local traditions of music, performance, craftwork, story-telling, etc., offering space for cultural reinforcement and a role in education and training.

<u>Recommendations</u>

- **Enable artists** to contribute to project planning and designs
- **Encourage all staff to develop a creative edge** to their thinking and work
- **Recognise artists can engage key audiences** – and offer an emotional connection
- **Build on the creative significance of a landscape and community** – strive to recognise local cultural values as a means of shaping and encouraging community participation
- **Treat the cultural value of nature as a key component of any landscape** – both to generate visitors and potentially, enhancing socio-cultural and economic sustainability

Culture

The story of the land is inevitably the story of its people and this narrative may have continued unbroken for millennia (although in many parts of Europe the reverse is the case, and indeed the link between nature and nation is often deeply problematic). Generations of land use – including deforestation, agriculture and pastoralism – may have created cultural landscapes that are valued for biodiversity, take for example the *montado* and *dehesa* agrosylvopastoral systems of Portugal and Spain. However, in other cases they may be severely degraded in terms of biodiversity. Whatever the case – whether the landscapes people have created are rich or poor in terms of biodiversity – they may have cultural value. These values must be recognised and respected – trying

to reverse the changes may well be controversial. Even if the events leading to a landscape's degradation are recent they are as much a part of the cultural narrative as what happened centuries before – indeed, it may be argued that they are more relevant, as the people involved may still be in the locale.

A concerted restoration effort should be regarded as only another chapter in the story of a particular landscape. Therefore, it is important that a restoration project should respect even the degraded aspects of the landscape as they tell real stories of real people and offer a valuable lesson to others. This may become manifested during the project by leaving some areas unrestored and managing them to keep them this way - they tell a story that could otherwise be forgotten in the years after restoration.

It is also possible for a restoration project to revive dormant cultural practices by instilling new pride in old traditions and, by a combination of education and creativity, enhance local cultural practices with associated opportunities for wider socio-cultural and economic benefits. In other cases it may be possible to stimulate new ones which are less damaging – replacing bird liming with bird watching for example.

Each generation defines what is 'natural' or 'normal' according to current conditions and their personal experiences. With each new generation, the expectations of various ecological conditions shifts. The result is that our standards are lowered almost imperceptibly – a phenomenon known as 'shifting baselines'. Fast cultural shift which is evident in so many parts of the world now – as well as rapid environmental shift – is likely to accelerate the speed with which people accept that diminished wildlife and landscapes are the 'norm'. Creative approaches have much to offer in helping people to understand these changes and potentially to increase support for restoring some of what has been lost, to improve conditions for the future and to help place checks on future damaging change through cultural resistance.

Recommendations

- **View the restoration project as a new chapter** in the long, fascinating narrative of the land.
- Ensure, during project development, that **the cultural history and traditions of the landscape and its communities are properly researched** and understood by the whole project team.
- Develop restoration-related activities that **enhance local traditions** and practices and explore potential socio-cultural and economic benefits, both tangible and intangible.

This guidance note has been adapted with additions and minor changes from:

Whitbread-Abrutat, P. H. (May 2012) *Exploring World Class Landscape Restoration*. Travelling Fellowship Report. Winston Churchill Memorial Trust.

Social and Cultural Considerations

By Felix Koninx

Introduction

The restoration of biodiversity and ecological processes has social and cultural implications. For projects looking for funding from the Endangered Landscapes program these implications are likely to be significant as restoration at the landscape scale means working with a mosaic of interdependent and interacting land uses and users.

Ecological restoration at the landscape scale cannot solely be about ecology. The definition used by the ELP makes this clear:

> *(Ecological Restoration is) The improvement of damaged or degraded[14] ecosystems on a large scale to create habitats rich in biodiversity and resilient to environmental change, with sustainable, long-term benefits to society.*

Benefits to society is a key part of this definition and is what makes projects legitimate and credible, especially in the face of other potential uses of the land. However, achieving these benefits requires appreciation of and meaningful engagement with the social and cultural contexts of the projects. Without this, projects will not reach their full potential.

The other key aspect of restoration is that it involves *change* – change in the status quo or change in the direction of ongoing processes. That change can unsettle and unbalance social norms and behaviors. Although it may be done with the best intentions, if not handled sensitively this change is more likely to lead to unhappiness, conflict, opposition and inequality.

Cultural considerations

Communities develop strong connections to the places where their members live and work, especially if they (and their ancestors) have played a role in how these places are shaped and formed, e.g. through farming or forestry practices. This leads to a strong sense of belonging with the landscape, and cultural attachment to it. Crucially, this value may not stem from the landscape's value for biodiversity or ecological resilience.

Sheep farming in the Lake District in the UK provides a good example of this. The Lake District is today formed of hills that are largely bare of trees, covered by grass or heather and grazed by sheep, with pastures separated by dry-stone walls. The landscape is valued by many who visit for its scenic beauty, but in large parts its biodiversity value is low, a fact bemoaned by many environmentalists. Some local farmers have expressed annoyance with the way in which views of the Lake District have been 'romanticized' by visitors and there have been efforts to reclaim the place for the local farmers who work there. Key to this process is highlighting the cultural significance of the cleared forests and the dry-stone walls. Whilst those concerned with conservation of biological diversity might complain about the 'ecological boredom' of the overgrazed fell, or note the incompatibility of drystone walls with landscape connectivity, for those who have created the landscape it is celebrated as home. This example illustrates that ecological restoration projects must consider the cultural significance of the

[14] "The term 'degraded' refers to any harmful alteration of an ecosystem such as the introduction and spread of an invasive species; the loss of important species interactions; the loss of biophysical attributes such as soil structure and chemistry or hydrological processes; and the decline in its potential to sustain livelihoods". Keenleyside, K.A., N. Dudley, S. Cairns, C.M. Hall, and S. Stolton (2012). *Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices*. Gland, Switzerland: IUCN. x + 120pp

landscape in which they work. Although the protection and restoration of biodiversity enjoys widespread support amongst the European public, it may encounter resistance at the local level.

Reconnecting natural and cultural heritage

The conflict between nature and cultural heritage may appear to be irreconcilable if we consider them separately. However, it has long been argued that this separation is artificial. Examples where nature and culture are conserved and celebrated through a more integrated approach can be found on the List of UNESCO World Heritage Sites (WHS) inscribed for both their Cultural and Natural Heritage, known by UNESCO as 'mixed sites'.

Example: The Laponian Area.

The Laponian Area in northern Sweden is one such site, where the biological, geological and cultural significance of Sami reindeer herding culture are included in the justification of its status. Prior to its inscription as a WHS in 1996 the area had long been a site of contention over land use. The objectives and priorities of the national parks in the area, the Sami reindeer herding communities and other industries were often in conflict. The balance between natural and cultural conservation in the management strategy was a key point in negotiations, exemplified by the (often conflicting) understanding of the area as 'Europe's Last Wilderness' as well as a 'Cultural Landscape' which had been shaped by human presence since time immemorial. The process of reconciliation of these views and values took a long time. It took 17 years from inscription to set up a management administration for Laponia. Success has come in the form of a management committee, *Laponiatjuottjudus*, with a Sami majority on the board and with stakeholders from the Swedish Environmental Protection Agency, the county and municipalities. Today Laponia is officially presented as a site of natural *and* cultural importance, with an administration that recognizes this and balances needs with every decision it takes. Many argue that this is only successful due to deep and meaningful participation, with emphasis on mutual learning and consensus. These lessons from the Laponian process could serve as inspiration for projects looking to tackle both loss of biodiversity and loss of cultural heritage associated for example with small scale traditional agriculture.

Importantly, culture should not be seen as an obstacle, a hassle to be negotiated with en-route to restoration objectives. Culture is ever changing and the 21st century will only see this change accelerate. There are opportunities for projects to be creative, to instill a culture of positive environmental pride and sentiment, often among people from very different backgrounds.

Social and economic considerations

Positive social impacts of ecological restoration are by now well documented. They can include broader employment and diversification opportunities for local people, and a strengthened sense of place and social identity promoting greater civic responsibility. Ecological restoration can safeguard cultural and natural heritage and provide more opportunities for environmental education and recreation, as well as health benefits derived from ecosystem services such as the provision of clean air and water.

Sustainable tourism seems to be one recurring benefit linked to restoration. The Lech River in Austria is an early example. Originally planned for hydropower development, it was designated as a Natura 2000 site and the area now enjoys dynamic fluvial habitats, supports rare plants, but also serves as a hub for recreation and experiencing nature. Local community leaders who were originally in support of hydropower development now support the protection of the area's ecological qualities, which have become a point of pride and importantly, income through the area's subsequent attraction to tourists.

Equity of impact – who benefits, who bears the cost?

The Lech River story serves as a case study for the social benefits of ecological restoration, delivered through sustainable tourism. However, just because a project succeeds in its goal of economic regeneration, doesn't mean project managers shouldn't ask further questions on the social implications of their work. For example, whom in the community will benefit most from ecological restoration and accompanied enterprise development? What inequalities could the project inadvertently create? Much has been written on the unequal distribution of tourism benefits. They have been found to be skewed based on gender, education, age, proximity to the destination, wealth and social connections. Further consideration should be placed on questions such as: Is there space for the whole community to be engaged in an enterprise, or would a co-operative be more feasible? Is there a risk of 'elite capture' of the project's benefits? How would a project balance catering to tourist tastes whilst still sticking to its ecological principles and conservation goals? What will happen to project feasibility if customer tastes change? Many of these questions are linked to the issue of where the costs and benefits of ecological restoration projects are received. There may be spatial inequalities that arise if people in rural areas are expected to bear the cost of catering to tourist tastes, or if carbon sequestration value prevents the use of forests by local populations, whilst urban dwellers drive there in their cars to appreciate the landscape's aesthetic beauty.

Getting to the root of conflict: Human-wildlife , or human-human?

In some instances, people will voice their opposition to ecological restoration projects. This may manifest itself in a variety of ways, from the killing of wolves to protect livestock in Switzerland to the poisoning of raptors to protect the economically valuable grouse on grouse shooting estates, as seen with red kites in the highlands of Scotland. If managers do not engage thoughtfully and collaboratively, key project stakeholders and possible partners may remain in opposition camps. These are classic and oft cited examples of human-wildlife conflicts in Europe. However, some argue that to make progress on these issues they should not be expressed in terms of human-wildlife conflict, but in terms of human-human conflict, a disagreement on how the land ought to be used. This is a common thread that runs through the ecological restoration agenda, and goes beyond debates over the protection of carnivores. For example, open landscapes managed by extensive herbivore grazing may be a wilder and more dynamic landscape, but such land use is challenged by interests from biofuels and other renewable energies that see unrealised potential for producing biomass. Wildlife corridors face considerable pressure when they're in the line of planned housing development or new roads that may be seen as key to economic development. This brings us back to understanding the landscape as a mosaic. Different users have different values informed by their interests which will affect how they assign priorities on how they use the land. Viewed in this way helps bring managers to the core of the issue, and focuses efforts on planning to resolve conflicts between land users early on, which is likely to be more efficient and effective than unsatisfactory technical fixes.

Land purchase or acquisition.

A further key issue is the social implication of direct land purchase or acquisition. Although often seen as a keystone to making ecological restoration projects on the landscape scale sustainable, such approaches have been critiqued as a 'green land grab' and as 'eco-colonialism'. 'Giving nature the space it needs' is seen by some as an inefficient and wasteful use of land, which could be used more productively. The end goal of most ecological restoration projects is to bring benefits both to humans and nature. It is however crucial to reflect on how land acquisition affects how these benefits are perceived by different stakeholders.

Rural depopulation

European policy exhibits a trend towards the protection of traditional extensive farming practices with the dual role of protecting extensive farming and biodiversity. Some argue that these traditional agricultural practices are not environmentally friendly, that rural populations do not live well, and that current mechanisms of subsidies for Less Favoured Areas (as part of the Common Agricultural Policy) are unlikely to prevent further depopulation. Ecological restoration projects that provide social and economic benefits to society can present compelling cases in such contexts offering an alternative that appears to deliver benefits for nature as well as employment and incomes for remaining communities. However, projects need to be sensitive to how they approach the issue of rural depopulation, recognising that restoration and 'rewilding' have roots in 'anti-human' schools of thought, and are often linked to notions of wilderness in which humans are absent from the landscape**.** A restoration movement that unreflectively celebrates declining population and simply sees it as an opportunity for nature is likely to lack social justice outcomes.

Participatory process

We end on a short note on participation. Participation in decision-making is an issue which is central to most efforts at landscape-scale ecological restoration. The most successful and sustainable projects will have meaningful participation from all stakeholders. Project managers should reflect on the nature of participation to ensure that it is genuine and equitable. Who has participated? What opportunities were given for participation? Are local priorities integrated into project objectives, or are top-down project objectives determining local land use practices? As this note has made clear, ecological restoration is as much a social and cultural process as an ecological one. There will inevitably be disagreements and contested values, different people will be affected in different ways, some will benefit, and others may not. Recognizing this, the need for projects to have a clear and transparent participatory process for decision-making and conflict resolution is crucial.

Project-based experiments to test interventions

1. The importance of assessing the effectiveness of interventions

Given the constraints on land and funding available for conservation, it is increasingly important that those areas being restored are subject to the most effective interventions to achieve the greatest impact. Funders and the public increasingly need assurance that conservation techniques really are successful. It is equally important to know when things work and when they do not, or when they have beneficial but completely unforeseen outcomes.

However, many interventions, including many that are widely applied, have not been thoroughly assessed in terms of what they actually deliver. Also, the environment is changing in many ways and it cannot be assumed that techniques for conservation established in the past are currently appropriate or will be successful in the future.

If effective ecological networks are to be created, there is a need to improve understanding of how wildlife responds to the creation and restoration of all types of 'conservation habitat'. Well-designed and conducted testing of interventions can greatly help conservation decision-making by answering many of the questions relevant to conservation in modern and future landscapes and by identifying which types of conservation intervention are likely to produce the best future outcomes for wildlife.

The exchange of information to improve the effectiveness of conservation will be increasingly important in the future. Evidence-based conservation is strongly advocated by the Endangered Landscapes Programme and a growing repository of information is available at www.conservationevidence.com. Findings from the types of studies carried out by projects funded by a grant from the Endangered Landscapes Programme will make valuable contributions to the growing body of evidence – there remain many gaps in knowledge, and the environment is constantly changing.

2. Project requirements

The Endangered Landscape Programme seeks to facilitate a process in which knowledge, information and experience from projects helps build capacity and drive improvements in the practice of landscape restoration.

Projects funded through the programme provide a valuable opportunity to add to the growing body of information available – so that future initiatives are underpinned by the evidence of what works, policy is evidence-based, and capacity is built based on shared experience.

Therefore projects funded by the programme will each include *at least* one experimental treatment that helps advance understanding of what works and what doesn't work when restoring landscapes, habitats and ecosystem processes. For this we are not interested in the response of the whole system but in identifying single interventions that are highly relevant to landscape restoration, such as whether growing trees in airpots (http://stairwaytrees.co.uk), standard pots or in a nursery and planted bare rooted results in highest survival and growth, or whether sowing a meadow with hemiparasites such as yellow rattle *Rhinanthus minor* results in higher diversity. The key point of such experiments should be to provide hard evidence of the effectiveness of one or more specific intervention that has potentially wide application.

3. Designing your treatment experiment: Key issues

What is the question?

As resources available are limited, decisions will frequently be needed about where to invest effort on testing interventions. It is important to identify a clear question, one that is critical to restoration at the site but also of widespread relevance (i.e. it concerns an issue that affects places beyond the site or landscape targeted by the project).

Basic design issues

Decisions will be needed on how to maximise the quality and value of the information derived from the resources that can be committed. Five points are of importance.

i. It needs to tackle a question or questions that is of practical importance and that is not already well known.
ii. Monitoring of the impact of the intervention needs to be sustainable in terms of available resources and commitment. We advocate simple designs, rather than complex experiments. Resources will always limit what can be undertaken and, the more complicated the monitoring scheme, the less sustainable or affordable it is likely to be.
iii. The data need to be gathered by using the same methods and intensity of sampling over time to ensure long-term comparability.
iv. The treatment itself (i.e. the exact intervention) needs to be well documented and measures of habitat change (if relevant) recorded.
v. There is absolutely no point in embarking on testing interventions and monitoring their impact if there is no chance that it will produce relevant and reliable information.
The objectives need to be clear and the basic design must be appropriate. This requires consideration of controls, replicates, sample sizes and sampling frequency.

The importance of controls

Scientifically, the use of clearly defined controls is best practice because it can produce the most convincing evidence of the effects of an intervention. Indeed, the inclusion of a control is usually essential in order to determine whether an intervention is really making any difference - in the absence of controls, one cannot be sure that observed changes are attributable to the treatment or intervention rather than to some other factor, e.g. changing climate, predator pressure or pollution.

It may be possible to strengthen the design further by gathering data before the intervention is made, allowing a 'before and after' comparison as well as a 'with and without intervention' comparison. Ideally, several examples (replicates) of the particular intervention of interest are needed in order to be reasonably sure that the observed response is constant and general.

So far as possible, sites or plots that are being compared should be similar (e.g. in terms of habitat type, soil type, elevation and surrounding-landscape composition and structure) so that they differ only in the treatment they receive.

Instead of comparing 'treatment' with 'no treatment' you may wish to test responses to different *kinds* of management by matching samples under different treatments, e.g. where 'conventional' or 'traditional' treatments may be regarded as a control against which a 'novel' treatment is compared.

Sampling frequency

In many circumstances it may not be necessary to sample every year. The intervals between sampling, however, do need to be determined in accordance with the speed with which vegetation and other habitat conditions change in relation to the habitat needs of any target organisms, and in response to the treatment. The rapidity of successional change tends to be far greater in the early stages of habitat development than in later stages. The niches for many early successional species are available for only short periods, so that, if sampling intervals are too wide, these may be missed. It may be possible to adopt mixed sampling intervals, whereby either (i) certain taxa are monitored at shorter intervals than others or (ii) a small sample of sites is monitored at short intervals but a much larger sample is then monitored at longer intervals.

Statistical analysis

The emphasis in this note has been on developing appropriate study designs, rather than on how to analyse the data that will be generated. Appropriate statistical analysis is important, but a study that is well designed at the outset will make the job of data analysis and interpretation far more straightforward. It is recommended, however, that some basic statistical advice is sought, e.g. on the numbers of replicates and the number of sample locations that may be appropriate when gathering data.

Social and economic dimensions

The descriptions above have been written mainly in the context of treatments relating to habitat management. In many cases some of the key issues and interventions affecting the outcome and sustainability of restoration interventions may relate to changes in governance, institutions, or economic incentives (for example). Projects are encouraged to test these interventions wherever possible, and if necessary to seek expert advice on how to do so from social scientists.

4. Proposal requirements

Project proposal (stage 2)

In the space provided in the application form, please include:

- A description of the intervention, treatment or other issue you propose investigating, and why it is important including its wider relevance to habitat and landscape restoration in Europe.
- Brief details of the experimental design – e.g. controls or comparison sites, replicates and approaches to sampling and analysis.
- Information on the team and any collaborators who will be involved in this aspect of the project, demonstrating the relevance of their qualifications and experience.

Full project plan (stage 3)

At this stage you will be expected to elaborate on the description provided in your proposal stage.

Acknowledgements

This guidance note includes text adapted from:

Fuller, R., Marshall, M., Eversham, B., Wilkinson, P. & Wright, K. (2016) The increasing importance of monitoring wildlife responses to habitat management. *British Wildlife*, Pages: 175 - 18

Theory of change (TOC)[15]

A Theory of Change approach provides a framework which encourages projects to develop comprehensive descriptions of how and why a desired change is expected to happen in a particular context. It is outcomes-based, and helps those involved to clearly define long-term goals and then map backwards to identify the necessary preconditions that will be required for success.

By grounding a project on good theory, managers can be better assured that their projects are carrying out the right activities for the desired outcomes. And by creating a theory of change projects are easier to sustain, bring to scale, and evaluate, since each step – from the ideas behind it, to the outcomes it hopes to provide, to the resources needed – are clearly defined within the theory.

Therefore, in the context of the Endangered Landscapes Programme, a ToC would be expected to make clear the steps to achieving a 'tipping point' within 5 years, and then the positive feedback loops and mutually reinforcing processes expected to cascade once the tipping point is reached (and the assumptions behind them).

Theory of change and logical framework: What's the difference?[16]

- A **theory of change** takes a wide view of a desired change, carefully probing the assumptions behind each step in what may be a long and complex process. Articulating a theory of change often entails thinking through all the steps along a path toward a desired change, identifying the preconditions that will enable (and possibly inhibit) each step, listing the activities that will produce those conditions, and explaining why those activities are likely to work. A ToC specifies *how* to create a range of conditions that help programmes deliver on the desired outcomes. A ToC is often, but not always, presented as a flow chart (with an accompanying narrative).
- A **logical framework matrix** takes a more narrow and practical look at the relationship between inputs and results. It is often presented as a table listing the steps from activities (plus inputs, resources) to outputs and outcomes through to the achievement of the desired programme goal, together with indicators and how they will be measured. It's primary use is as a project management tool.

Theory of change is both a process and a product

At its simplest, theory of change is a dialogue-based process intended to generate a description of a sequence of events that is expected to lead to a particular desired outcome. There is no standard format but this description is usually captured in a diagram that allows the reader to see the big picture quickly, and an accompanying narrative. Together they provide a guiding framework of the change model showing how and why the desired goal can be reached by the project team and stakeholders.

Developing a theory of change usually requires discussion between the different stakeholder groups of the following elements (in order):

[15] This note has been compiled from edited and adapted text from the following sources:

- http://learningforsustainability.net/post/theory-of-change/
- Vogel, I. (2012) *ESPA guide to working with Theory of Change for research projects*. LTS/ITAD. (http://www.espa.ac.uk/files/espa/ESPA-Theory-of-Change-Manual-FINAL.pdf)

[16] Text adapted from: http://portals.wi.wur.nl/files/docs/ppme/Grantcraftguidemappingchanges_1.pdf

- **The context for the initiative**, including social, political and environmental conditions, the current state of the problem the project is seeking to influence and a description of other actors able to bring about change;
- **The long-term outcomes** that the initiative seeks to support and who and/or what will ultimately benefit;
- The essential precursors and broad **sequence of events** anticipated (or required) to lead to the desired long-term outcome;
- The **assumptions** about how these changes might happen, and about contextual drivers that may affect whether the activities and outputs are appropriate for influencing the desired changes in this context;
- A **diagram** and **narrative summary** that represents the sequence and captures the discussion.

The main benefit of theory of change comes from making different views and assumptions about the change process explicit. A good theory of change will specify how to create a range of conditions that help projects deliver on the desired outcomes. These can include setting out the right kinds of partnerships, types of forums, particular kinds of technical assistance, and tools and processes that help people operate more collaboratively and be more strongly focused on results.

Where to go for more information on ToC:

These two websites contain resources on TOC and other project planning and management tools:

- Learning for Sustainability: http://learningforsustainability.net/theory-of-change/
- Centre for Theory of Change: http://www.theoryofchange.org/what-is-theory-of-change/

This worksheet from Nesta provides a very simple, 'bite-sized' introduction and template for ToC. Note that you may need to use a separate workshop for each problem in a large, complex landscape: http://diytoolkit.org/media/Theory-of-Change-Size-A4.pdf

This manual from Grantcraft provides slightly more detailed (12 pages) step-by-step guidance on developing a ToC: http://www.grantcraft.org/assets/content/resources/theory_change.pdf

This is a more detailed, but still straightforward guide to ToC (30 pages): http://www.thinknpc.org/publications/creating-your-theory-of-change/